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Tumble Dryer Dispenser

The present invention relates to a device for treating, fabrics inside a tumble dryer.

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In the treatment of fabrics in a tumble dryer it is known to use conditioner dispensing articles, comprising means for attachment of the substrate to the tumble dryer wall. Other proposals, such as for instance disclosed in GB 1,399,728 involve the use of separate means for attaching the conditioning article to the tumble dryer wall.

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EP-B-361593 concerns an alternative approach in which a fabric conditioning article comprises a combination of a substrate and a fabric conditioning composition, the substrate being a porous material with a specified void volume and cell count. The article of EP-B-361593 is designed to adhere to the tumble dryer wall.

15

A problem with some devices of this kind is that it can be difficult to achieve a reliable attachment of the device to the tumble dryer interior.

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It is an object of the present invention to provide an improved device suitable for treatment fabrics in a tumble dryer, and in particular a device with improved attachment properties.

25

According to the present invention, there is provided a device for treating fabrics in a tumble dryer during multiple tumble drying cycles, the device comprising a

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support member and a reservoir for storing fabric treatment composition attachable to said support member, the support member including one or more suction cups for attachment of the support member to the tumble dryer interior, and
5 preferably the door, wherein the suction cup/s have one or more respective suction cup actuators.

With this arrangement, the reservoir does not restrict access to the suction cup. Force can therefore be applied
10 directly to the suction cup actuator which allows for more effective suction and consequently more effective attachment of the support member to the tumble dryer interior.

A further advantage is that attachment of the support member
15 need not necessitate excessive pressure being exerted on the reservoir which could then leak.

The suction cup and actuator may be moveable relative to e.g. resiliently mounted on the support member. An advantage
20 of this is that force can be applied to the suction cup actuator without restriction on such movement by the structure/rigidity of support member.

There may be one or more suction cups mounted substantially
25 centrally on the support member. This gives the advantage of a central point of attachment to the dryer interior, providing optimum stability of the device.

The suction cup may have a smoothly curved outer perimeter,
30 e.g. circular or oval.

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The suction cup may be of any suitable size appropriate to the size, weight of the dispenser.

As stated above, the invention allows more effective
5 attachment of the suction cup, which therefore does not need to be excessively large.

The suction cup may occupy approximately from 30% to 90%, and preferably 40% to 60% of the total area of the support
10 member. In one embodiment, the suction cup occupies 50% of the total area.

The device may be sized to allow manual installation using one hand. Accordingly the device may have an average
15 diameter equivalent to an average hand span, e.g. 14 cm or less, and preferably 12 cm or less. In one embodiment the device has an average diameter of approximately 11 cm.

The reservoir for storing fabric treatment composition may
20 be attachable to said support member in any suitable manner. Preferably the reservoir is attachable so as to lock into position. Accordingly the reservoir and support member may have corresponding inter-engagement members.

25 The inter-engagement members may comprise one or more pairs of projections or one or more pair projections and apertures on corresponding respective portions of the reservoir and support member which are configured for snap-fit engagement.

30 By the term aperture, it is intended to mean any formation suitable for receipt of a projection, and accordingly this

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term includes but is not limited to: slots, recesses, through-holes.

- The inter-engagement members may include resilient portions
5 to facilitate engagement. For example, the one or more projections may include respective resilient hinge portions to allow flexing of each projection during engagement with a corresponding aperture.
- 10 Alternatively or additionally, the aperture may include resilient portions to facilitate engagement.
- The one or more projections and/or apertures may include locking features to facilitate or improve snap-fit
15 engagement. For example one or more projections may include one or more lugs which lock the projection/s into the respective aperture/s. The one or more lugs may be inclined to facilitate smooth engagement.
- 20 The one or more projections may be biased toward a locking position with a respective aperture/projection, whereby relative resilience of the projection and or aperture and or device itself allows movement of the projection for engagement/disengagement.
- 25 The device may include transfer means to expose fabric treatment composition from the reservoir to airflow generated inside the tumble drier and/or to directly contact fabrics in the dryer, thereby transferring a portion of the
30 fabric treatment composition into contact with fabrics in the tumble dryer during a tumble drying cycle.

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Some modern tumble dryers have a one or more small holes in the inside of the door to allow moisture out of the tumble dryer drum to condense in a tray below or vented to the outside of the machine. In this case, a hook or claw attachment on the device may also be included for supplemental attachment.

5 The transfer means may comprise two or more flow control members arranged in series, wherein the flow control characteristic of the members decreases across the series.

The flow control characteristic preferably decreases in the direction of flow across the transfer means.

10 The flow control characteristic may decrease progressively across the series, i.e., it decreases with each flow control member, or there may be static regions of the transfer means, whereby the flow control characteristic remains unchanged across adjacent members, or even increases across 20 members within the series. However, preferably, there should be an overall decrease in the flow control characteristic across the series.

15 The transfer means may comprise at least an inner flow control member and an outer flow control member arranged in series, wherein the flow control characteristic of the inner flow control member is greater than that of the outer flow control member.

25 30 As used herein, the term "flow control characteristic" is intended to refer to any property which represents/brings

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about the impedance/control of the flow of fabric treatment composition passing through the member.

Decreasing the flow control characteristic across the series
5 may involve selecting relative pore sizes of the respective members (e.g. an inner member having a higher flow control characteristic i.e. smaller pore size as compared an outer member having a lower characteristic (larger pore size.). Other features may be selected additionally or alternatively
10 to the pore size so as to control the flow, e.g. member thickness.

As used herein, the terms "transfer means" and "flow control member", should be construed as including any structure(s)
15 acting to actively or passively allow the flow of fabric treatment composition thereacross whereby the composition from the reservoir can be exposed to the air in the dryer or to directly contact fabrics in the dryer.

20 With this arrangement, precise flow control and thereby precise dosing of fabric treatment composition may be effected by an inner flow control member(s) which is/are protected by an outer flow control member(s) which is/are less precise but may therefore be more robust so providing a barrier(s) or shield(s) for the inner member(s). Delicate but precise materials may be used for the inner member(s) but it/they is/are not subjected to mechanical damage by tumbling fabrics, zips, buttons etc during a tumble dry cycle because of the protection afforded by the outer
25 member(s).

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- The advantage of the support member in this case is that this can be firmly attached to the interior of the dryer by directly applying force to the suction cup actuator, without any contact with and consequential pressure on the transfer means.
- 5 The device reservoir can be attached afterwards, and can utilise an attachment mechanism which does not require excessive force (such as the snap fit arrangements referred to herein above), thereby protecting the transfer members.
- 10 The outer flow control member or members may be of greater rigidity than the inner flow control member(s). In this way, the outer members are not deflected to the extent that they impinge on the inner membrane, as this could interfere with the precise flow control of the inner control member.
- 15 Preferably, the flow control member(s) are spaced apart to define a gap therebetween, whilst being in fluid communication with each other and the reservoir. With this arrangement, any flexing of an outer member (e.g. in response to contact by fabrics, zips, buttons etc) can be isolated from the inner member, which is thereby protected.
- 20 Thus, any potential consequential interference in precise flow control exerted by an inner membrane is prevented.
- 25 Preferably the most delicate flow control member (e.g. the innermost) is spaced apart from the other flow control members (which may not necessarily be spaced apart as they may not require protection).

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The transfer means may be a dedicated component of the body or may form part of the device body and/or reservoir which may be a optionally integral.

5 The inner flow control member(s) may, for example, comprise a membrane, or a layer of e.g. semi permeable material/s e.g. polyester, polypropylene or the like or a woven/non-woven membrane which may be, but is not intended to be restricted to a thin skin.

10 The transfer means may be fixed in position around its perimeter and preferably has an effective area of 500-2500mm².

15 The reservoir may be removable from a housing or body portion locating the transfer means which is in fluid connection with the reservoir (when installed). Such fluid connection may be effected by a connecting channel or duct.

20 The fluid connection preferably includes an inlet port or channel for receiving a predetermined amount of the composition from the reservoir sufficient for a predetermined number of cycles at a given temperature, time and load size and may further include a charging port or channel or recess situated directly behind the membrane for continuous feed or charging of the flow control members.

25 In further embodiments of the invention, the flow control members may include a multiplicity of very small openings or pores. The inner member(s) may include a precise but delicate or mechanically weak structure as compared with the outer flow control member(s). Accordingly the inner

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member(s) may comprise a semi-permeable membrane through which the fabric composition can be precisely dosed to the fabrics. Suitable semi-permeable materials may include Goretex™ and Accurel™. The outer flow control members may 5 be formed from more rigid but less precise semi-permeable materials including open cell pumice, sintered materials etc.

The transfer of fabric treatment composition to the fabrics 10 in the tumble drier may be effected solely by airflow generated in the tumble drier. Depending upon the model of the tumble drier and program setting temperatures of up to 100°C with wet clothes may be generated within the tumble drier, generally in the range 30°C to 80°C for most drying 15 cycles (the hot air generated by the heater in the tumble drier may be as high as 150°C, generally 110°C to 120°C).

In addition, the transfer may be constructed and arranged such that there may be direct contact between fabric in the 20 tumble drier and the exposed fabric treatment composition in order to facilitate transfer of fabric treatment composition to the fabric.

Accordingly, the external profile of the flow control 25 member(s) and/or that part/surface of the device in which the member(s) are located, may be shaped so that in use (i.e. attached to a generally upright tumble dryer wall or door) it/they are generally upright.

30 With this configuration, the Applicants have found that the member/part/surface can more easily contact the fabrics in

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the dryer directly contact fabrics in the dryer, thereby transferring a portion of the fabric treatment composition into contact with fabrics in the tumble dryer during a tumble drying cycle.

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The device may be configured to present a smooth external profile when attached to a door or wall. This feature has the advantage that it prevents or at least can reduce the possibility of the device damaging the fabrics as they move through the dryer. It may not be important that the attachment part of the device is smooth, if this is not exposed when the device is fixed in place. In one embodiment the external profile is generally hemispherical, and optionally including an upright (in use) portion as described above.

15

The reservoir may hold sufficient fabric composition for any number of drying cycles and for instance the reservoir may hold sufficient composition for a single cycle. With this arrangement, different compositions could be used for different drying cycles allowing great flexibility for the user.

20

The reservoir of the device of the invention may alternatively or additionally be capable of holding sufficient fabric treatment composition for a plurality of drying cycles of the tumble drier. In this case, the reservoir preferably holds sufficient composition for at least six, preferably at least ten drying cycles, more preferably at least twenty cycles, of the tumble drier. The device may comprise means for dispensing a unit dose of

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fabric composition from the reservoir at or before the start
of the drying cycle which is sufficient to provide the
required amount of fabric treatment composition during the
drying cycle. The reservoir may be divided into a plurality
5 of cavities or compartments each containing fabric
composition, the contents of each cavity may be sequentially
transferred to the transfer means.

The means for indicating to the user when the fabric
10 treatment composition is used up preferably comprises
visible indicia associated with the device. In one
embodiment of the invention, the user is able simply to
inspect the quantity of fabric treatment composition
remaining in the device by looking through the at least one
15 opening of the reservoir to the composition therein.

Alternatively, the fabric treatment composition may be
impregnated in a solid substrate which gives an appearance
change, for example changes colour, when all the fabric
treatment composition has been used up. In another
20 embodiment of the invention, the reservoir may be formed
from a transparent or translucent material to allow visual
inspection of the quantity of fabric treatment composition
inside the reservoir.

25 The device of the invention may further comprise a flow
controller to allow the user to regulate the quantity of
fabric treatment composition contacted by the warm air in
the tumble dryer during a tumble drying cycle.

30 Preferably the device can be used to treat fabrics during
multiple tumble drying cycles. With this arrangement, the

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dispenser may be more convenient as the user only need replenish the fabric treatment composition after a number of cycles.

- 5 The device of the invention preferably comprises means for indicating to the user when the fabric treatment composition is used up, which has the advantage of enabling the user to determine when the fabric treatment composition or the device itself needs replacing. A further advantage of attachment of the device to the tumble dryer door is that it makes it easier to replace or refill the device when the fabric treatment composition is used up than is the case with prior art devices attached to the tumble dryer drum.
- 10
- 15 The device according to the invention may comprise a reservoir which is designed to be replaced when the fabric treatment composition is used up. For example, the reservoir may be provided in the form of a disposable plastic container e.g. bottle, carton or collapsible pouch which may have a peelable lid.
- 20

Alternatively, the reservoir may be designed to be recharged with a new fabric treatment composition when required. In this case the reservoir has an openable portion for charging and, if necessary, discharging the fabric treatment composition. For example, the reservoir may be provided in the form of an openable compartment into which may be placed a block or semi-permeable sachet of fabric treatment composition. Suitable materials for the reservoir include polypropylene.

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The fabric treatment composition may be in the form of a liquid, solid or gel. The composition preferably comprises at least a perfume component and optionally water and may also comprise one or more perfume solubilisers. In this way 5 the composition can act as a freshening composition.

In addition, according to a further aspect of the invention there is provided a kit for the treatment of fabrics in a tumble drying cycle, comprising the combination of the 10 device of the invention comprising support member and reservoir together with a instructions for use of the device, including installation/refilling of said support member and reservoir.

15 In addition, according to the invention there is provided a method of treating fabrics in a tumble dryer during multiple tumble drying cycles comprising attaching a support member and then reservoir of the device according to the invention to the inside of a tumble dryer door and carrying out a 20 tumble drying process with fabrics inside the tumble dryer.

Further provided in accordance with the invention is a tumble dryer with a support member (and optionally reservoir) of the device according to the invention attached 25 therein.

Various non-limiting embodiments of the invention will now be more particularly described with reference to the following figures in which:

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Figure 1 is a perspective view of a device according to one aspect of the invention, showing the support member and reservoir prior to attachment;

5 Figure 2 is a perspective view of the support member of Figure 1;

Figure 3 is perspective view of the reservoir of the device of Figure 1, showing components reservoir bottle and body in more detail;

Figures 4a to 4b are various views of the reservoir bottle.

10 Figure 5 shows the support member being installed; and Figures 6 and 7 show the device from the rear.

Similar reference numbers are used throughout the figures to identify common features.

15 Referring to the drawings, there is illustrated a device 1 (shown orientated upright and viewed in perspective) for treating fabrics in a tumble dryer (not shown) during multiple tumble drying cycles, the device comprising a support member 2 and a reservoir 6 for storing fabric treatment composition attachable to said support member 2, the support member 2 including a suction cup 8 for attachment of the support member 2 to the tumble dryer interior, and preferably the door, wherein the suction cup 2 has a respective suction cup actuator 10.

25

The support member 2 is a generally circular element with a peripheral skirt 14.

30 The suction cup 8 and rigid actuator 10 are fixed together and resiliently mounted centrally on the support member by means of a flexible bridge 12. The bridge 12 is supported

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by two inclined legs 16,18. The flexibility of the bridge 12 allows force to be applied to the suction cup actuator 10 without restriction on such movement by the skirt 14. Whilst the legs are sufficiently stiff and the skirt 14 dimensioned 5 to abut the surface of the interior of the dryer, so as to restrict movement of the support member 2 once attached.

The suction cup 8 has a radius of 3.6 cm and (when viewed in plan view) occupies 50% of the total area of the support 10 member 2 which has a radius of 5.4 cm (however the radius of the member 2 progressively increases to 5.8 cm at three points which will be described in more detail below).

The device 1 is sized to allow manual installation using one 15 hand.

The reservoir 6 comprises a rigid dome shaped body 20 housing a reservoir bottle 22 configured for snap-fit engagement in a recess (not shown) of body 20. The reservoir 20 recess constitutes a major part of the upper half of the body 20 (when orientated upright).

The reservoir 6 is attachable to the support member 2 so as to lock into position. Accordingly the reservoir 6 and 25 support member have corresponding inter-engagement members 30,31,32,33,34,35.

The inter-engagement members comprise three pairs of projections 31,33,35 and apertures 30,32,34 on corresponding 30 respective outer portions 31a,33a,35a of the reservoir body 20 and outer portions 30a,32a,36a of the skirt 14 of the

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support member 2 which are configured for snap-fit engagement.

- The inter-engagement members 30,31,32,33,34,35 are
- 5 resiliently mounted or include resilient portions to facilitate engagement. The projections 31,33,35 flex by means of limited radial resilience of skirt 14 upon which they are mounted.
- 10 The lowermost (when upright as shown in figures 1,2,3) of the apertures 32 has an inclined wall 40 to assist engagement of the corresponding projection 31. The remaining apertures 32,34 are simply rectangular through-holes. Thus, the device can be fitted firstly by inserting
- 15 projection 33 into aperture 32 to locate reservoir 6 relative to support member 2, and then simply pressing the remaining projections simply squeezes at the top two lugs and pulls forward.
- 20 The projections include locking lugs 41, 42, 43 lock the projections 31,33,35, into the respective apertures 30,32,34,. The lugs 41, 42, 43 are inclined radially inwards to facilitate smooth engagement.
- 25 Locking is improved by the projections 31,33,35 being biased radially outwards, toward a locking position with a respective projection 30,32,34, whereby relative resilience of the mounting of the projections 31,33,35 allows movement of the projections 31,33,35 for engagement/disengagement.

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As shown more clearly in figure 3, the reservoir body 20 includes a chamber or inlet port 208, having a capacity to hold a predetermined volume of fluid freshener, which is, in this embodiment 1.5ml and is sufficient for one drying cycle 5 of 1 hour at 60 degrees C. However, the inlet port may have a volume sufficient for any number of cycles. The port 208 is located beneath (when the device is held oriented as it would be when attached to the dryer door) and in fluid communication with the reservoir recess 204 to allow liquid 10 to enter the port 208 from the reservoir bottle 22 when it is in place in the recess 204.

The rear of the device (shown in figures 6 and 7) is recessed and also contains a hook 300 for supplemental 15 attachment to the tumble dryer door of e.g. condenser dryers (which have slots or holes in the door or pitted surface). One possible hook shape is shown comprising an elongate arm which is pivotable about a pivot 302 through about 90 degrees, between a storage position in which the hook 300 is 20 enclosed within the rear recess and an attachment position in which it projects from the device. The hook is curved only where it connects with the device - it is straight at the opposite end, as the gentle curve blocks the removal of the machine filter in some machines, so needs to be removed 25 from the design for such machines.

As shown in figs 4a - 4g, the reservoir bottle 22 comprises a polypropylene bottle with body portion and neck portion 214. The body portion is defined by three main generally 30 crescent shaped faces: a front face 222 and a rear face 224 and a shoulder face 226. The front and rear faces 222,224,

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extend from opposed edges of the shoulder face 226 and depend therefrom to meet at a common curved edge 228. The radius of curvature of the rear face 224 is less than that of the front face 222.

5

The reservoir recess 204, has a curved back wall 230, base wall 232 and top wall or lip 234 which correspond in shape with the rear face 222 shoulder face 226 and edge 228 respectively so that the reservoir is retained in the recess 10 by the walls 230, 232 and 234 and by the retaining overhanging edges of 202 and by the engagement of the neck portion 214 with the port 208. The neck is configured for engagement with the inlet port 208, taking into account of any seals: The inlet port 208 may include an annular 15 resilient seal 216 of a thermoplastic elastomer (TPE) to ensure leak proof engagement of the reservoir bottle 22 with the port 208.

The reservoir bottle 22 preferably has a pin-hole (not 20 shown) in the edge region 228 or front face 222 or back surface 224 so that as fluid freshener leaves the bottle it can be replaced with air, gradually, so as not to interfere with the gradual flow of the fluid to the membrane. This has the advantage of ensuring consistency in delivery of 25 composition.

Insertion and removal is aided by limited flexibility of the refill bottle 22 and reservoir body 20 such that snap-fit installation and removal can be effected easily.

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The support member 2 is first attached to the tumble dryer interior, by applying direct force to the suction cup actuator 10. The reservoir 6 can then be attached (with reservoir bottle in place or without) as and when fabric treatment composition needs to be dispensed. When no fabric treatment is required, the reservoir 6 can be removed and the support member 2 left in place.

10 The device shown further includes a transfer means and is the general dome shape is modified by inclining the portion housing the transfer means outwardly, so that in use (i.e. attached to an upright tumble dryer door or wall) the transfer means is orientated upright.

15 The transfer means comprises two flow control members (not shown in detail but indicated at 300): an inner delicate but precise flow control member and an outer protective barrier or shield. The inner flow control member is a polypropylene membrane 210. In one embodiment this has with a thickness of 160 microns and a pore size of 0.2 microns. However other thickness/pore size values may be used, the appropriate pore size and thickness of the membrane varying depending on the fabric treatment composition viscosity, and the delivery rate required.

25 The outer membrane is a sinter material having a pore size of 35 micron, which is rigid as compared with the inner membrane and spaced apart therefrom. Flexing of the outer membrane is kept to a minimum due to its rigidity but if any flexing does occur (e.g. if more flexible material is used) 30 the space between inner and outer members means the inner

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membrane is not contacted by the outer membrane as it flexes. This protects the inner membrane.

This members are fixed around their perimeters preferably by 5 ultrasonic welds and preferably, to enable a better seal (for the purpose of preventing leaking of the fabric treatment composition), by a substantially continuous weld, to a window frame 212.

Optionally, the inlet port 208, is integral with the window 10 frame, again, to enable a leak proof system. The manufacture of the framed membrane involves melting upstanding ribs on the frame by ultrasonic welding so as to weld these to the perimeter of the membrane. The framed membrane 210 is attached to the device body 202 (by the ultrasonic welding 15 which is done with the port/frame/membrane in situ in the device body 202).

The area inside of the welded perimeter provides the effective flow control area that is to say the active part of the flow control members.

20

In the embodiments, the area is $40 \times 27\text{mm} = 1080\text{mm}^2$. Another embodiments (not shown) may have has larger area of $50 \times 27\text{mm} = 1350\text{mm}^2$, or larger still, Such as $80 \times 30 = 2400\text{mm}^2$.

25 Preferably the effective part of the transfer means has an area in the range $500-5000\text{mm}^2$.

Behind the members is a recess of corresponding shape which has a slightly projecting perimeter region for attachment of the frame thereto, so that a gap is defined between the inner member and the recess wall. In this narrow gap 30 approximately 2-3 mm, a small amount of freshener fluid can

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collect to 'charge' or 'feed' the members continuously without causing leakages.

It is important to prevent leakage of the fabric treatment 5 composition, as this can lead to staining of fabrics.

In use the reservoir bottle 22 is disposed with the neck pointing downwards, engaging the inlet port so that fluid from the reservoir bottle 22 flows, under gravity to the 10 port and then to the members from where it evaporates/transfers in the dryer.

The fabric treatment composition may take any suitable form, for example it may be as described in any of the following 15 embodiments (e.g. solid, liquid, gel at room temperature).

Exemplary fabric treatment compositions may be as follows:

A. A first fabric treatment composition, is defined as a 20 heat activated fabric treatment composition comprising:

(a) from 3 to 75wt% of one or more fabric treatment active ingredients;

25 (b) from 10 to 50 wt% of water;

(c) from 5 to 40 wt% of an oil; and

30 (d) optionally from 2 to 20 wt% of a nonionic surfactant.

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Samples of this composition are represented by a number.
Comparative samples are represented by a letter.

All values are % by weight of the active ingredient unless
5 stated otherwise.

The samples in table 1 were prepared as follows:

The quat, oil and optional solvent were weighed in a beaker
10 and heated on a hot plate until molten (about 70°C). Hot
water (also about 70°C) was then slowly dosed into the
molten mixture with stirring. To this mixture, perfume was
added and stirring continued until a 'clear' liquid was
produced. The liquid was bottled and left to cool either in
15 the bottle or on a rotary blender.

Table 1

Sample	1	2	3	A	B	C
Quat (1)*	50	50	50	80	50	50
Sirius M85 (2)	20	0	0	0	0	0
NP-35 (3)	0	20	0	0	0	0
Estol 1545 (4)	0	0	20	0	0	0
DPG (5)	5	5	5	10	0	5
PEG 200 (6)	0	0	0	0	25	0
Glycerol	0	0	0	0	0	20
Perfume	5	5	5	5	5	5
Water	20	20	20	5	20	20

- 20 (1) Stepantex VL85G(85%), tallow (IV about 35) based TEA
quaternary ammonium material with 15% DPG solvent (ex Stepan)
(2) mineral oil, ex Fuchs
(3) mineral oil, ex Emca
(4) ester oil, ex Unigema

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(5) dipropylene glycol (ex Dow Chemicals). This was present in addition to any DPG present in the raw material of the quaternary ammonium material.

(6) polyethylene glycol 200, ex Clariant

5

For materials in table marked "*", the amount denotes the level of raw material present.

Staining Evaluation

10

Staining evaluation was then carried out on the fabrics identified in Table 2.

15 Table 2

Garment	Fabric type	Colour	Texture
Single jersey	100% acrylic	Multicolour	Knitted, thick
Sport trousers	100% nylon	buff	Woven with woven nylon lining, light
Green shirt	100% cotton	Green	Woven, light
Blue shirt	100% Polyester	Blue	Woven peach skin (brushed), heavy
Fleece	52% polyester 40% cotton 8% lastane		Towel looped knit, heavy
Jeans trousers	100% cotton	Blue	Denim
Cotton monitor	100% cotton	Black	Woven, light
Microfibre monitor	100% polyester	Pearly	Woven, light
Pongee monitor	100% polyester	Pink	Tuffata, lining type

20 A 1.5kg load was washed in a Miele Novotronic W820 washing machine using 80g of un-perfumed Persil fabric washing powder at a 40°C wash temperature. The fabrics were spin

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dried and then transferred to a Miele Novotronic T43 tumble dryer.

The dispensing device - as described on page 16 line 26 to 5 page 20 line 12 and shown in Figures 1, 3 and 4 of patent application PCT/EP01/11785 having a membrane thickness of 160 μ m, a membrane pore size of 0.2 μ m and membrane area of 1080mm² - was charged with 30g of the sample and then attached to the internal side of the door of the tumble 10 dryer and the 60 minutes "Cotton Extra Dry" drying cycle started. At the end of the cycle the fabrics were removed. Comparative evaluation with tumble dryer sheets was also made (for each cycle a single tumble dryer sheet was used).

15 Staining was evaluated by a panel of trained laboratory personnel in a standard Viewing Cabinet (D65 light, simulating typical northern hemisphere outdoor light). The panel assessed the staining of the aqueous compositions with a critical eye using different viewing angle and observing 20 over a black background.

Unless otherwise indicated, each sample was assessed 3 times with the fabric being washed as described above between each assessment.

25 Staining was ranked according to the number of stains and the size/visibility of the stains on a scale of from 0 to 5 where 0 represented no staining and 5 represented severe staining.

30 The results are given in table 3 below.

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Table 3

Sample	TDS (1)	TDS (2)	1	A
Microfibre	2.5	0	1	2
Pongee	-	-	1	3
Jeans	0	0	0	0.5

- 5 (1) Bounce - purchased in UK 2001
(2) Snuggie - purchased in US 2001

Delivery Evaluation

- 10 The following compositions were prepared according to the method described above.

Table 4

Sample	4	5	6	7	8	D	E
Quat (1) *	50	55	50	55	50	50	55
DC 245 (2)	25	20	0	0	0	0	0
NP-35 (3)	0	0	20	20	0	0	0
Estol 1545 (4)	0	0	0	0	20	0	0
DPG (5)	0	0	5	0	5	0	0
DPnB (6)	0	0	0	0	0	25	40
Perfume	5	5	5	5	5	5	5
Water	20	20	20	20	20	20	0

- 15 (1) Stepantex UL G80(80%), hardened tallow (IV < 1) based TEA quaternary ammonium material with 20% DPG solvent (ex Stepan)
(2) Volatile silicone oil, ex Dow Chemicals
(3) mineral oil, ex Emca
20 (4) ester oil, ex Unigema
(5) ester oil, ex Unigema

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(5) dipropylene glycol (ex Dow Chemicals). This was present in addition to any DPG present in the raw material of the quaternary ammonium material.

(6) dipropyl glycol n-butyl ether

5

"*" denotes the level of raw material present.

Delivery evaluation was carried out as follows:

10 Approximately 30g of the sample to be evaluated (table 4) was transferred to a dispensing device - described above. The device was then attached to the inside of the door of the Miele tumble dryer and the 60-minute "Cotton extra dry" heating cycle started.

15

For each sample, the amount of product delivered was measured at intervals during the heating cycle.

20 Delivery of between 1 and 2 grams of product during the 60 minute cycle was desirable. Below this amount, insufficient active ingredient would be delivered to the fabric. Significantly greater amounts than this would cause staining problems.

25 The amount in grams of each sample delivered is given in table 5.

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Table 5

Time/mins	0	10	20	30	40	50	60
Sample 5	0	0.04	0.11	0.28	0.5	0.76	1.06
Sample 6	0	0.2	0.5	0.7	0.9	1.2	1.4
Sample 7	0	0.05	0.14	0.38	0.68	0.92	1.04
Sample 8	0	0.5	0.67	1.11	1.3	1.59	1.8
Sample D	0	0.26	2.88	-	-	-	-
Sample E	0	0.89	2	-	-	-	-

For samples D and E, delivery was ceased after approximately
 5 20 minutes due to the excess of product delivered.

Staining Evaluation

Staining evaluation of the samples of table 4 was then
 10 carried out on the garments identified in table 2.
 Evaluation was made according to the method described in the
 example above.

The results are given in table 6

15

Table 6

Garment	Sample 5	Sample 7	Sample 8	Sample D	Sample E
Single jersey	0	0.5	-	-	-
Sport trousers	0	0	-	-	-
Green shirt	0.5	0	-	-	-
Blue shirt	0.5	0	-	-	-
Fleece	0.5	1	-	-	-
Jeans trousers	0	0.5	-	-	-
Cotton monitor	1	0	0.5	2.5	1.5
Microfibre monitor	0.5	0.5	1	3	2.5
Pongee monitor	0.5	0	1.5	4	3

"-" denotes not measured.

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Perfume Evaluation

5 Perfume evaluation was also carried out using samples 4 to 8 and a standard commercially available tumble dryer sheet (Bounce, purchased in UK in 2001) over 10 wash and dry cycles.

10 A 1.5kg load containing equal weight mixtures of cotton, polycotton, polyester, nylon, acrylic, microfibre monitors and pongee polyester monitors was washed as described above. The washed articles were spin dried and transferred to a Hotpoint Aquarius Tumble Dryer and then tumble dried for 60 minutes. This process was repeated 10 times, with the 15 dispensing device remaining in position and without being recharged. After each cycle the articles were removed and assessed then washed and the cycle repeated until 10 cycles completed. For the sample containing the tumble dryer sheet, a new sheet was introduced before each drying cycle.

20 For each of the samples 4 to 8, perfume strength on fabrics after each drying cycle was significantly stronger than perfume strength on fabrics treated with the tumble dryer sheet.

25

Further Staining Evaluation

30 The following compositions were prepared by weighing the quat, oil, nonionic and optional solvent into a beaker and heating on a hot plate until molten (about 70°C). Hot water

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(also about 70°C) was then slowly dosed into the molten mixture with stirring. Perfume was added and stirring continued until a 'clear' liquid was produced. The liquid was left to cool either in a bottle or on a rotary blender.

5

Table 7

Sample	9	10	11	12	13
Quat (1) *	20	0	40	35	40
Quat (2) *	0	20	0	0	0
Emmon SCR-PK (3)	30	30	0	0	0
Squalane 99% (4) *	0	0	20	0	0
Semtol 70/28 (5)	0	0	0	15	0
Sirius M40 (6)	0	0	0	0	20
Nonionic coco 11EO (ex Slovasol)	20	20	5	10	5
Dipropylene glycol	5	5	0	0	0
Water	20	20	30	35	30
Perfume	5	5	5	5	5

- (1) Stepantex ULG60 80% (DPG 20%) a hardened tallow TEA
10 (2) Quaternary ammonium material (IV< 1) (ex Stepan)
(2) Stepantex VL85G(85%) (15% DPG) a tallow TEA (IV < 1)
quaternary ammonium material (ex Stepan)
(3) A sugar ester oil based on palm kernel (ex KAO)
(4) A natural oil (ex Aldrich)
15 (5) A white mineral oil (ex Goldschmidth)
(6) A white medicinal quality mineral oil (ex Silkolene)

"*" denotes the level of raw material present.

- 20 All above formulations produced microemulsions at the heating temperature of a tumble dryer.

- 30 -

Staining performance was evaluated according to the method described in the examples above. The results are given in table 8.

5 Table 8

Sample	TDS (1)	9	11	12	13
black monitor	0.5-1	0.5	0.5-1.0	0.5	0.5
blue shirt	0.5-1.0	1.0-1.5	0.5	0.5-1.0	0.0-0.5
Pongee	0.5-1.0	0	0	0.5	0
green shirt	0	0	0	0	0
microfibre (monitor)	0.5	0.5-1.0	0-0.5	0.5	0
sport trousers	0	0.5	0	0	0
Fleece	0	0	0	0	0
Jeans	0	0	0	0	0
Jersey	0	0	0	0	0

(1) Bounce, purchased UK 2001.

- 10 An alternative composition B is defined as a heat activated fabric treatment composition comprising
- (a) from 3 to 75wt% of one or more fabric treatment active ingredients;
 - (b) from 5 to 50 wt% of a nonionic surfactant; and
 - 15 (c) from 10 to 50 wt% of water.

Examples of this kind of composition are as follows:

The samples in table B1 were prepared as follows:

- 20 The quat, nonionic and optional solvent were weighed in a beaker and heated on a hot plate until molten (about 70°C). The molten mixture was then added with stirring to hot water (also about 70°C) to which optional components such as a

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polyelectrolyte or salt had already been added. To this mixture, perfume was added and stirring continued until a 'clear' liquid was produced. The liquid was bottled and left to cool either in the bottle or on a rotary blender.

5

Table B1

Sample	A	1	2	3	4	5	6	7
Quat (1)*	80	10	20	0	0	0	0	0
Quat (2)*	0	0	0	40	40	40	30	10
Quaternised triethylene amine (3)	0	0	0	0	0	0	5	0
Polyelectrolyte (4)	0	0	0	0	0	0	0	16
Nonionic surfactant (5)	0	40	40	10	0	15	10	0
Nonionic surfactant (6)	0	0	0	0	15	0	0	33
DPG (7)	10	0	0	0	0	0	15	5
Glycol hydroxy phthalyl hydroxy phthalate (8)	0	0	0	15	10	0	0	0
Water	5	45	35	30	30	40	40	31
Perfume	5	5	5	5	5	5	5	5

- (1) Stepantex VL85G(85%), tallow (IV ~ 35) based TEA quaternary ammonium material with 15% DPG solvent (ex Stepan)
- (2) Stepantex UL G60 80% (DPG 20%), hardened tallow (IV < 1) based TEA quaternary ammonium material with 20% DPG solvent (ex Stepan)
- (3) TEA (ex Aldrich) fully quaternised with di-methyl sulphate
- (4) Catiofast CS (30% solution), ex BASF
- (5) Genapol C200 (coco alcohol 20EO) ex Clariant
- (6) Slovasol 2411, (coco alcohol 11EO) ex Sloveca
- (7) dipropylene glycol (ex Dow Chemicals). This was present in addition to any DPG present in the raw material of the quaternary ammonium material.
- (8) Glycol HPHP, ex Eastham

For materials in table marked **, the amount denotes the level of raw material present.

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The viscosity of the samples was measured at a shear rate of 106s^{-1} using a Haake Rotoviscometer RV20 cup and bob NV1 at both ambient temperature and at the heating temperature of the tumble dryer. The results are given in table B2.

5

Table B2

Temp/°C	25	30	32	34	36	38	40	42	44	46	48	50	53	56	58	60	62
A	1067	1040	850	670	510	350	260	190	160	140	120	110	89	77	70	65	65
2	S	S	S	S	S	780	595	231	211	190	173	164	150	133	128	120	105

"S" denotes that the composition was solid.

10

Delivery Evaluation

Delivery evaluation was carried out as follows:

- 15 Approximately 30g of the sample to be evaluated (table B1) was transferred to a dispensing device - as described on page 16 line 26 to page 20 line 12 and shown in Figures 1, 3 and 4 of patent application PCT/EP01/11785 having a membrane thickness of $160\mu\text{m}$, a membrane pore size of $0.2\mu\text{m}$ and
20 membrane area of 1080mm^2 . The device was then attached to the inside of the door of a Miele Novotronic T43 tumble dryer and a 60 minute "Cotton Extra Dry" heating cycle started.
- 25 For each sample, the amount of product delivered was measured at intervals during the heating cycle. A comparison was also made with commercial tumble dryer sheets. The amount in grams of each sample delivered is given in table B3.

30

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Table B3

Time/mins	0	10	20	30	40	50	60
Temperature/°C	26	47	57	53	34	27	25
Sample A	0	0.03	0.22	0.55	0.77	0.97	1
Sample 2	0	0.09	0.30	0.49	0.85	1.08	1.35
Sample 6	0	0.05	0.25	0.42	0.70	0.95	1.25
Bounce (1)	0	0.2	0.43	0.67	0.8	0.97	0.93
Snuggle (1)	0	0.29	0.46	0.71	0.9	1	1.09

(1) commercial tumble dryer sheets purchased in US December
 5 2001.

Staining Evaluation

10 Staining evaluation was then carried out on the fabrics
 identified in Table B4.

Table B4

Garment	Fabric type	Colour	Texture
Single jersey	100% acrylic	Multicolour	Knitted, thick
Sport trousers	100% nylon	Buff	Woven with woven nylon lining, light
Green shirt	100% cotton	Green	Woven, light
Blue shirt	100% Polyester	Blue	Woven peach skin (brushed), heavy
Fleece	52% polyester 40% cotton 8% lastane		Towel looped knit, heavy
Jeans trousers	100% cotton	Blue	Denim
Cotton monitor	100% cotton	Black	Woven, light
Microfibre monitor	100% polyester	Pearly	Woven, light
Pongee monitor	100% polyester	Pink	Tuffata, lining type

15

A 1.5kg load was washed in a Miele Novotronic W820 washing machine using 80g of un-perfumed Persil fabric washing

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powder at a 40°C wash temperature. The fabrics were spin dried and then transferred to a Miele Novotronic T43 tumble dryer.

5 The dispensing device - as described above - was charged with 30g of the sample and then attached to the internal side of the door of the tumble dryer and the 60 minute "Cotton Extra Dry" drying cycle started. At the end of the cycle the fabrics were removed.

10 Staining was evaluated by a panel of trained laboratory personnel in a standard Viewing Cabinet (D65 light, simulating typical northern hemisphere outdoor light). The panel assessed the staining of the aqueous compositions with 15 a critical eye using different viewing angle and observing over a black background.

Unless otherwise indicated, each sample was assessed 3 times with the fabric being washed as described above between each 20 assessment.

Staining was ranked according to the number of stains and the size/visibility of the stains on a scale of from 0 to 5 where 0 represented no staining and 5 represented severe 25 staining.

The results are given in table B5 below.

Table B5

30

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Sample	A	1	2	3*	6	7*
Black monitor	2.0-2.0	1.0-1.5	0.5-1.5	1.0-1.5	0.5-1.0	0
Blue shirt	2.0-2.0	0.0-1.5	0.0-1.5	2.0-2.5	0.5-1.5	0
Pongee	3.0-3.0	0.0-1.0	0.0-0.5	1.0-1.5	0.5-1.0	0
Green shirt	1.0-2.0	1.0-1.5	0.0-0.5	1.5-2.0	0-1.5	0
Microfibre (monitor)	1.5-2.0	0.5-1.0	0.0-1.0	2	0.0-2.0	0
Sport trousers	0.0-1.0	0	0	0	0	0
Fleece	0.0-0.50	0	0	0	0	0
Jeans	0.0-0.50	0	0	0	0	0
Jersey	0.0-0.50	0	0	0	0	0

*single test only

Further Staining Evaluation

5

Staining evaluation was also carried out using the samples (table B1) and a standard commercially available tumble dryer sheet (Bounce, purchased in UK in 2001) over 10 wash and dry cycles.

10

A 1.5kg load containing equal weight mixtures of cotton, polycotton, polyester, nylon, acrylic, microfibre monitors and pongee polyester monitors was washed as described above. The washed articles were spin dried and transferred to a

15

Hotpoint Aquarius Tumble Dryer and then tumble dried on medium setting for 60 minutes. This process was repeated 10 times, with the dispensing device remaining in position and without being recharged. After each cycle the articles were removed and assessed then washed and the cycle repeated 20 until 10 cycles completed. For the sample containing the

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tumble dryer sheet, a new sheet was introduced before each drying cycle.

Staining was evaluated using the method described above. The
5 average results over the ten cycle are given in table B5.

Table B5

Sample	Bounce	2
Delivery/g	0.42	1.15
Static	2.11	0.11
Cling	2.36	0.26
Pongee	1.13	0.06
Microfibre	1.83	0.39
Average Stain	1.48	0.23

10 The results demonstrate that the amount of the sample of the invention (and hence the amount of active ingredient) deposited on the fabrics was significantly greater than the amount deposited from the tumble dryer sheet. In spite of this, the staining evaluation results show a significantly
15 lower level of staining on fabrics treated with sample 2 than on fabrics treated with the commercially available tumble dryer sheet.